JUL 13 1990

AFC, Division of MMFG
Highway 52 South • Chatfield, MN 55923-9797
Telephone 507/867-3479 • FAX 507/867-4031

Aligned Fiber Composites

July 10, 1990

Michael McAteer
Ecology and Environment, Inc.
111 West Jackson Blvd.
Chicago, IL 60604

RE: AFC Site Investigation

Dear Mike:

Enclosed is a copy of a subsurface exploration which was done in the area of our underground storage tanks at our Manufacturing Plant. This information should have been included in my letter to you dated July 6, 1990. Please note that this report pertains specifically to Question No. 12. Sorry about the mix-up.

Best Regards,
AFC

Dennis Thorson

Dennis Thorson
PLANT ENGINEER

DT/jh

enclosure

twin city testing
corporation

3908 COMMERCE COURT S.W.
ROCHESTER, MN 55902
PHONE 507/288-7060

December 15, 1986

A F C, Inc.
Highway 52 South
Chatfield, MN 55923

Attn: Mr. Dennis Thorson

Ladies/Gentlemen

Subj: Subsurface Exploration Program
Underground Storage Tanks
A F C, Inc.
Chatfield, Minnesota
#4800 87-90

We have recently conducted a subsurface exploration at your plant in Chatfield, Minnesota. The purpose of our work was to:

1. Put down borings at the locations suggested by you.

2. Determine the general subsurface conditions, including subsurface water level information and bedrock depth in the areas of the proposed construction.

3. Provide logs depicting the conditions encountered.

4. Perform laboratory tests of representative soil samples.

This work was performed in accordance with your verbal authorization on December 2, 1986.

The soil conditions encountered at the boring locations are illustrated on the attached data sheets. We wish to point out that the subsurface conditions at other times and locations on the site may differ from those found at the test locations. Please refer to the attached data sheets for the soil conditions at each boring location. Review of these logs suggest a general soil profile at the site consisting of various alluvial soils overlying sandstone and weathered limestone.

The alluvium was sands, sand with silt, sandy lean clays and lean clays. Penetration resistances of the alluvial soils noted loose sands and medium consistency clays.

At depths of 5' to 10', weathered St. Peter Sandstone or Shakopee Limestone was found. These materials were present to the termination depth of the borings. Borings #2 and #3 obstructed within the formation, while boring #1 was taken to 16½'.

Subsurface water was not encountered at the boring locations. Lack of water in these borings should not be taken as an accurate indication of the actual water conditions. Often an extended period of time would be required for ground water to stabilize in open bore holes. This period of time is not available during the scope of a normal exploration. For additional water level information, piezometers (water measurement devices) should be installed. Some variation in the water levels can be expected seasonally and with fluctuations in available moisture.

Samples of the soils were submitted to the laboratory for chemical analysis tests. These were completed at your request, and we have attached the results of this chemical analysis with this letter.

As the samples were obtained in the field, they were visually and manually classified by the crew chief in accordance with ASTM:D2488. Representative portions of the samples were then returned to the laboratory for further examination and for verification of the field classification. Logs of the borings indicating the depth and identification of the various strata, the N value, water level information and pertinent information regarding the method of maintaining and advancing the drill holes are attached. Charts illustrating the soil classification procedure, the descriptive terminology and the symbols used on the boring logs are also attached.

Our involvement at this site has not included any review of the subsurface conditions with regard to foundation support, slope stability, or other subsurface features which may affect current and future construction. We have on our staff registered professional engineers available to discuss further work should you require it.

Our remarks are based on data we assume to be representative of the site explored, but because the area of the borings in relation to the entire area is very small and for other reasons, we do not warrant the soil conditions below the depth of our borings or that the strata logged from our borings are necessarily typical of the entire site.

If we can be of further service to you as this project progresses, please feel free to contact us.

Very truly yours

David L. Morrill ac.

David L. Morrill, P.E.
Senior Geotechnical Engineer

DLM/mcb

Encs.

twin city testing
corporation
3908 COMMERCE COURT SW
ROCHESTER, MN 55901
PHONE 507/288-7060

REPORT OF: CHEMICAL ANALYSIS

PROJECT: UNDERGROUND STORAGE TANKS
CHATFIELD, MINNESOTA

DATE: December 12, 1986

REPORTED TO: A F C, Inc.
Highway 52 South
Chatfield, MN 55923

COPIES TO:

LABORATORY No. 4800 87-90

INTRODUCTION:

This report presents the results of our analysis of samples received by this laboratory on December 5, 1986 from a representative of Twin City Testing. The scope of our work was limited to analyzing the samples for the presence of styrene.

SAMPLE IDENTIFICATION:

TCT #29780 B-1 13½'
TCT #29781 B-2 7-9½'
TCT #29782 B-3 1½'-2'

METHODOLOGY:

The samples were analyzed using heated headspace techniques on a Perkin-Elmer 3920 gas chromatograph equipped with FID. Styrene was identified by column retention to those of a known standard on a VG Laboratory data system.

RESULTS:

Sample Identification	Styrene (ug/gm)
B-1 13½'	ND[1]
B-2 7-9½'	ND
B-3 1½'-2'	ND

[1]ND=Not detected. Lower Detectable limit is 0.5 ug/gm. ug/gm=parts per million.

REMARKS:

The samples were analyzed on December 11, 1986. The samples will be held for thirty days from the date of this report, then discarded unless other arrangements are made.

TWIN CITY TESTING CORPORATION

Chris Bremer
Asst Laboratory Supervisor

Harold D Fisher
Chromatography Group Leader

CB/HDF/hjl

LOG OF TEST BORING

JOB NO 4800 87-90 VERTICAL SCALE 1" = 3' BORING NO. 1

PROJECT UNDERGROUND STORAGE TANKS - A F C, INC. - CHATFIELD, MINNESOTA

DEPTH IN FEET	DESCRIPTION OF MATERIAL (SURFACE ELEVATION 110.6')	GEOLOGIC ORIGIN	N	WL	SAMPLE NO.	SAMPLE TYPE	LABORATORY TESTS W	D	L.L. / P.L.	Qu
	SAND W/SILT, fine grained, brown and dark brown, moist, very loose (SP-SM)	COARSE ALLUVIUM	4		1	SB				
2	SILTY SAND, brown, moist, loose (SM)		6		2	SB				
4	SAND W/SILT, fine to medium grained, brown, yellowish brown and reddish brown, loose (SP-SM)		5		3	SB				
			6		4	SB				
9	SANDY LEAN CLAY, brown, soft, a lens of wet Sand at 10½' (CL)	MIXED ALLUVIUM	4		5	SB				
12	WEATHERED SANDSTONE, yellowish brown, tan and white [Textural Classification: SAND W/SILT, moist, medium dense (SP-SM)]	WEATHERED ST. PETER SANDSTONE	14		6	SB				
			12		7	SB				
16½	END OF BORING									

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	BAILED DEPTHS	WATER LEVEL
12-2	1:40	16½'	14½'	16½'	to	None
					to	
					to	
					to	

START 12-2-86 COMPLETE 12-2-86

METHOD HSA 0-14½' @ 1:40

CREW CHIEF K. Johnson

LOG OF TEST BORING

JOB NO. 4800 87-90 VERTICAL SCALE 1" = 3' BORING NO. 2

PROJECT UNDERGROUND STORAGE TANKS - A F C, INC. - CHATFIELD, MINNESOTA

DEPTH IN FEET	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	N	WL	SAMPLE NO.	SAMPLE TYPE	LABORATORY TESTS W	D	L.L. / P.L.	Qu
	SURFACE ELEVATION 102.4'									
	FILL, a mixture of SILT AND SILTY SAND, a little Silty Clay	FILL	6		1	SB				
1½	SILTY SAND, brown (See #1) (SM)	COARSE*								
2	LEAN CLAY, brown, medium (CL)	FINE ALLUVIUM	5		2	SB				
4½	WEATHERED SANDSTONE, yellowish brown and tan	WEATHERED ST. PETER SANDSTONE	13		3	SB				
	[Textural Classification: SAND W/SILT, fine to medium grained, moist, medium dense (SP-SM)]		15		4	SB				
10½	WEATHERED LIMESTONE, brown	SHAKOPEE FORMATION	29		5	SB				
	[Textural Classification: SANDY LEAN CLAY (CL)]									
12½	OBSTRUCTION: End of Boring									
	#1-moist, loose	*ALLUVIUM								

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	BAILED DEPTHS	WATER LEVEL
12-2	2:50	12½'	12'	12½'	to	None
					to	
					to	
					to	

START 12-2-86 COMPLETE 12-2-86

METHOD HSA 0-12' @ 2:50

CREW CHIEF K. Johnson

LOG OF TEST BORING

JOB NO. 4800 87-90 VERTICAL SCALE 1" = 3' BORING NO. 3

PROJECT UNDERGROUND STORAGE TANKS - A F C, INC. - CHATFIELD, MINNESOTA

DEPTH IN FEET	DESCRIPTION OF MATERIAL (SURFACE ELEVATION 95.5')	GEOLOGIC ORIGIN	N	WL	SAMPLE NO.	SAMPLE TYPE	LABORATORY TESTS W	D	L.L./P.L.	Qu
	FILL, mostly SILTY SAND, a layer of crushed limestone at grade	FILL	28		1	SB				
1½	WEATHERED LIMESTONE, tan	WEATHERED SHAKOPEE FORMATION	100/0.7		2	SB				
	[Textural Classification: SANDY SILT W/GRAVEL, very dense (SP-SM)]		50		3	SB				
6.9	OBSTRUCTION: End of Boring									

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	BAILED DEPTHS	WATER LEVEL
12-2	3:40	6.9'	6.9'	-	to	None
					to	
					to	

START 12-2-86 COMPLETE 12-2-86

METHOD HSA 0-6.9' @ 3:40

CREW CHIEF K. Johnson

twin city testing corporation

SE 12177 B1 3

GENERAL NOTES

DRILLING AND SAMPLING SYMBOLS

SYMBOL	DEFINITION
HSA	3 1/4" I.D. Hollow Stem Auger
FA	4", 6" or 10" Diameter Flight Auger
HA	2", 4" or 6" Hand Auger
DC	2 1/2", 4", 5" or 6" Steel Drive Casing
RC	Size A, B, or N Rotary Casing
PD	Pipe Drill or Cleanout Tube
CS	Continuous Split Barrel Sampling
DM	Drilling Mud
JW	Jetting Water
SB	2" O.D. Split Barrel Sample
L	2 1/2" or 3 1/2" O.D. SB Liner Sample
T	2" or 3" Thin Walled Tube Sample
3TP	3" Thin Walled Tube (Pitcher Sampler)
TO	2" or 3" Thin Walled Tube (Osterberg Sampler)
W	Wash Sample
B	Bag Sample
P	Test Pit Sample
Q	BQ, NQ, or PQ Wireline System
X	AX, BX, or NX Double Tube Barrel
CR	Core Recovery - Percent
NSR	No Sample Recovered, classification based on action of drilling equipment and/or material noted in drilling fluid or on sampling bit.
NMR	No Measurement Recorded, primarily due to presence of drilling or coring fluid.
▼	Water Level Symbol

TEST SYMBOLS

SYMBOL	DEFINITION
W	Water Content - % of Dry Wt. - ASTM D 2216
D	Dry Density - Pounds Per Cubic Foot
LL, PL	Liquid and Plastic Limit - ASTM D 4318
	Additional Insertions in Last Column
Qu	Unconfined Comp. Strength-psf - ASTM D 2166
Pq	Penetrometer Reading - Tons/Square Foot
Ts	Torvane Reading - Tons/Square Foot
G	Specific Gravity - ASTM D 854
SL	Shrinkage Limits - ASTM D 427
OC	Organic Content - Combustion Method
SP	Swell Pressure - Tons/Square Foot
PS	Percent Swell
FS	Free Swell - Percent
pH	Hydrogen Ion Content, Meter Method
SC	Sulfate Content - Parts/Million, same as mg/L
CC	Chloride Content - Parts/Million, same as mg/L
C*	One Dimensional Consolidation - ASTM D 2435
Qc*	Triaxial Compression
D.S.*	Direct Shear - ASTM D 3080
K*	Coefficient of Permeability - cm/sec
D*	Dispersion Test
DH*	Double Hydrometer - ASTM D 4221
MA*	Particle Size Analysis - ASTM D 422
R	Laboratory Resistivity, in ohm - cm - ASTM G 57
E*	Pressuremeter Deformation Modulus - TSF
PM*	Pressuremeter Test
VS*	Field Vane Shear - ASTM D 2573
IR*	Infiltrometer Test - ASTM D 3385
RQD	Rock Quality Designation - Percent

* See attached data sheet or graph

WATER LEVEL

Water levels shown on the boring logs are the levels measured in the borings at the time and under the conditions indicated. In sand, the indicated levels may be considered reliable ground water levels. In clay soil, it may not be possible to determine the ground water level within the normal time required for test borings, except where lenses or layers of more pervious waterbearing soil are present. Even then, an extended period of time may be necessary to reach equilibrium. Therefore, the position of the water level symbol for cohesive or mixed texture soils may not indicate the true level of the ground water table. Perched water refers to water above an impervious layer, thus impeded in reaching the water table. The available water level information is given at the bottom of the log sheet.

DESCRIPTIVE TERMINOLOGY

DENSITY TERM	"N" VALUE	CONSISTENCY TERM
Very Loose	0-4	Soft
Loose	5-8	Medium
Medium Dense	9-15	Rather Stiff
Dense	16-30	Stiff
Very Dense	Over 30	Very Stiff

Standard "N" Penetration: Blows Per Foot of a 140 Pound Hammer Falling 30 inches on a 2 inch OD Split Barrel Sampler

Lamination	Up to 1/2" thick stratum
Layer	1/2" to 6" thick stratum
Lens	1/2" to 6" discontinous stratum, pocket
Varved	Alternating laminations of clay, silt and /or fine grained sand, or colors thereof
Dry	Powdery, no noticeable water
Moist	Below saturation
Wet	Saturated, above liquid limit
Waterbearing	Pervious soil below water

RELATIVE GRAVEL PROPORTIONS

CONDITION	TERM	RANGE
Coarse Grained Soils	A little gravel	2 - 14%
	With gravel	15 - 49%
Fine Grained Soils		
15-29% + No. 200	A little gravel	2 - 7%
15-29% + No. 200	With gravel	8 - 29%
30% + No. 200	A little gravel	2 - 14%
30% + No. 200	With gravel	15 - 24%
30% + No. 200	Gravelly	16 - 49%

RELATIVE SIZES

Boulder	Over 12"
Cobble	3" - 12"
Gravel	
Coarse	3/4" - 3"
Fine	#4 - 3/4"
Sand	
Coarse	#4 - #10
Medium	#10 - #40
Fine	#40 - #200
Silt & Clay	- #200, Based on Plasticity

CLASSIFICATION OF SOILS FOR ENGINEERING PURPOSES
ASTM Designation: D 2487 - 83
(Based on Unified Soil Classification System)

SOIL ENGINEERING

			Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests[A]	Soil Classification: Group Symbol	Soil Classification: Group Name[B]
Coarse-Grained Soils More than 50% retained on No. 200 sieve	Gravels More than 50% coarse fraction retained on No. 4 sieve	Clean Gravels Less than 5% fines[C]	$Cu \geq 4$ and $1 \leq Cc \leq 3^E$	GW	Well graded gravel[F]
			$Cu < 4$ and/or $1 > Cc > 3^E$	GP	Poorly graded gravel[F]
		Gravels with Fines More than 12% fines[C]	Fines classify as ML or MH	GM	Silty gravel[F,G,H]
			Fines classify as CL or CH	GC	Clayey gravel[F,G,H]
	Sands 50% or more of coarse fraction passes No. 4 sieve	Clean Sands Less than 5% fines[D]	$Cu \geq 6$ and $1 \leq Cc \leq 3^E$	SW	Well-graded sand[I]
			$Cu < 6$ and/or $1 > Cc > 3^E$	SP	Poorly graded sand[I]
		Sands with Fines More than 12% fines[D]	Fines classify as ML or MH	SM	Silty sand[G,H,I]
			Fines classify as CL or CH	SC	Clayey sand[G,H,I]
Fine-Grained Soils 50% or more passes the No. 200 sieve	Silts and Clays Liquid limit less than 50	inorganic	PI > 7 and plots on or above "A" line[J]	CL	Lean clay[K,L,M]
			PI < 4 or plots below "A" line[J]	ML	Silt[K,L,M]
		organic	$\frac{\text{Liquid limit - oven dried}}{\text{Liquid limit - not dried}} < 0.75$	OL	Organic clay[K,L,M,N] Organic silt[K,L,M,O]
	Silts and Clays Liquid limit 50 or more	inorganic	PI plots on or above "A" line	CH	Fat clay[K,L,M]
			PI plots below "A" line	MH	Elastic silt[K,L,M]
		organic	$\frac{\text{Liquid limit - oven dried}}{\text{Liquid limit - not dried}} < 0.75$	OH	Organic clay[K,L,M,P]
					Organic silt[K,L,M,Q]
Highly organic soils		Primarily organic matter, dark in color, and organic odor		PT	Peat
Fibric Peat >67% Fibers		Hemic Peat 33%-67% Fibers		Sapric Peat <33% Fibers	

[A] Based on the material passing the 3-in (75-mm) sieve.

[B] If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name

[C] Gravels with 5 to 12% fines require dual symbols:
- GW-GM well-graded gravel with silt
- GW-GC well-graded gravel with clay
- GP-GM poorly graded gravel with silt
- GP-GC poorly graded gravel with clay

[D] Sands with 5 to 12% fines require dual symbols:
- SW-SM well-graded sand with silt
- SW-SC well-graded sand with clay
- SP-SM poorly graded sand with silt
- SP-SC poorly graded sand with clay

[E] $Cu = D_{60}/D_{10}$ $Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}}$

[F] If soil contains ≥15% sand, add "with sand" to group name.

[G] If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

[H] If fines are organic, add "with organic fines" to group name.

[I] If soil contains ≥15% gravel, add "with gravel" to group name.

[J] If Atterberg limits plot in hatched area, soil is a CL-ML, silty clay.

[K] If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant

[L] If soil contains ≥30% plus no. 200, predominantly sand, add "sandy" to to group name.

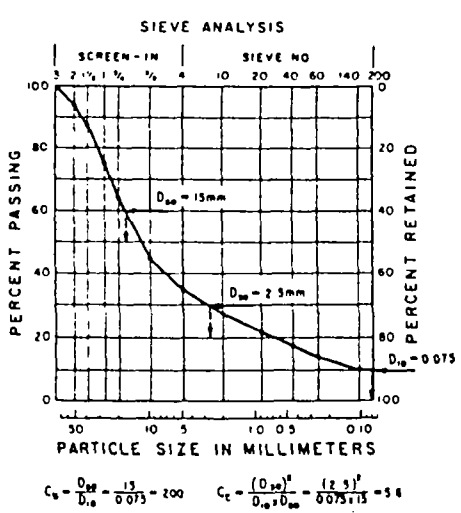
[M] If soil contains ≥30% plus No. 200, predominantly gravel, add "gravelly" to group name

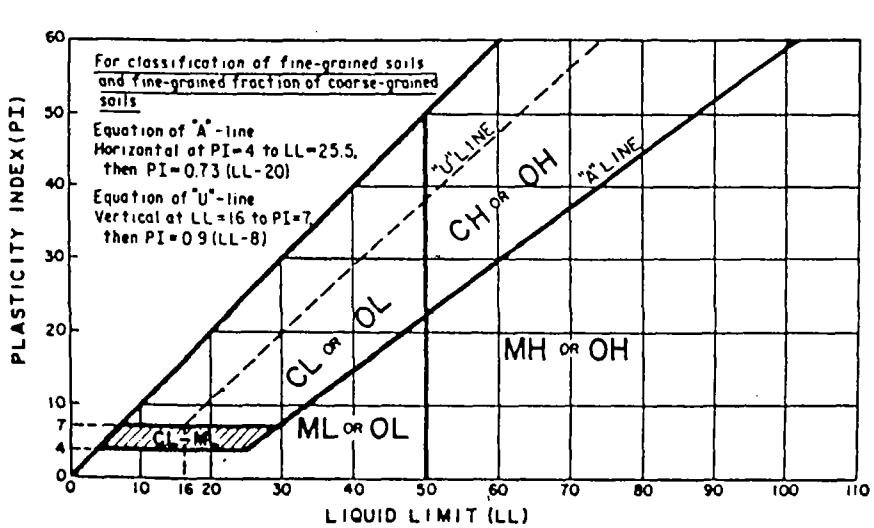
[N] PI ≥ 4 and plots on or above "A" line.

[O] PI < 4 or plots below "A" line.

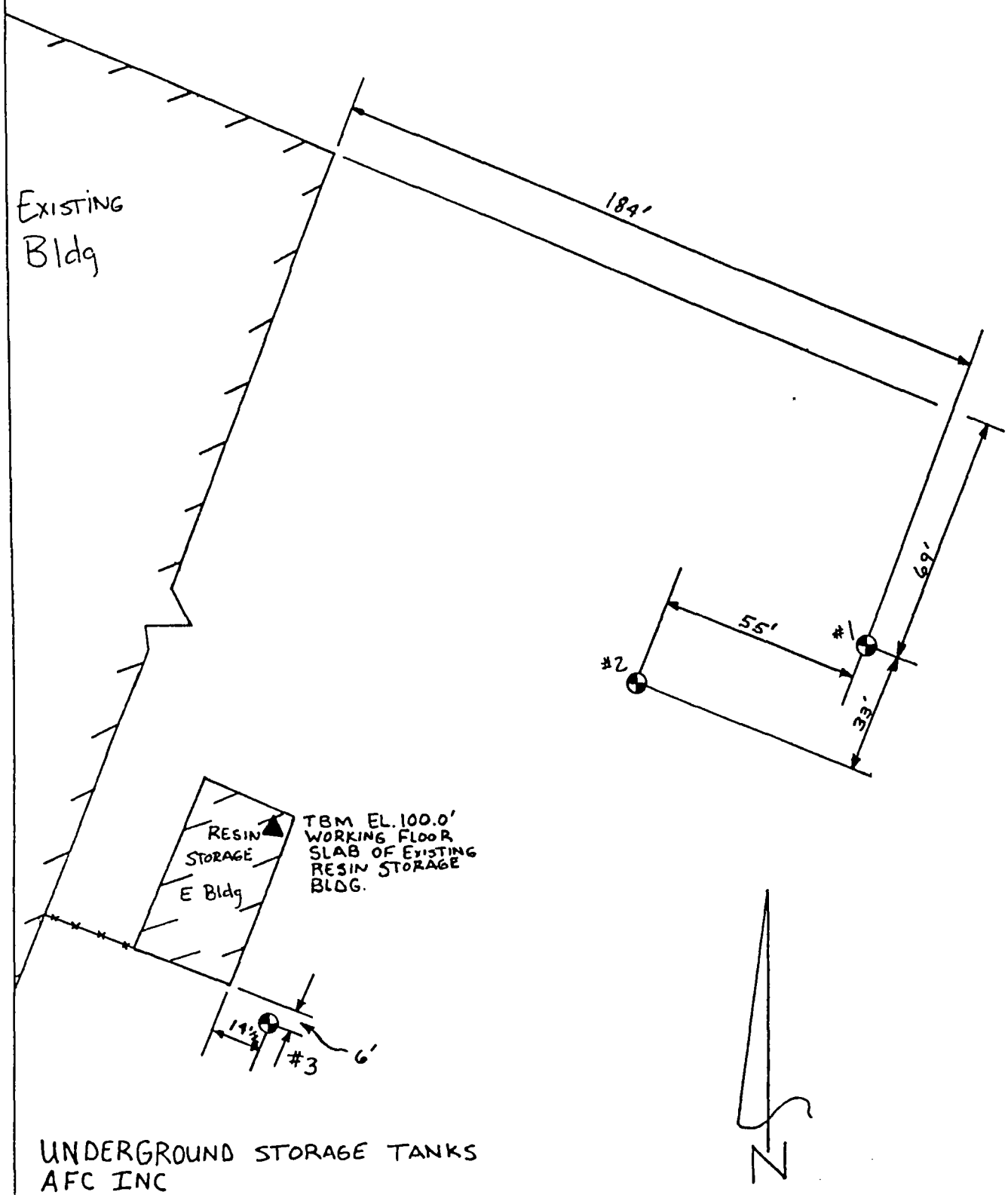
[P] PI plots on or above "A" line.

[Q] PI plots below "A" line.





twin city testing
corporation



UNDERGROUND STORAGE TANKS
AFC INC
CHATFIELD, MN

	JOB NO. 4800-87-90	SCALE: 1" = 40	DRAWN BY RJ	CHECKED BY